



## HEMOGLOBIN C AND HEMOGLOBIN C-TRAIT

Physician's information sheet written by pediatric hematologist James Harper, MD,  
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Hemoglobin C is a congenital disorder of hemoglobin that is inherited in the same autosomal recessive manner as sickle cell disease. The incidence of hemoglobin C in the general population has been reported to be about half that of sickle cell hemoglobin (Hemoglobin S). There have been several infants in Nebraska with Hemoglobin C trait identified through the Newborn Screening Program since the State began screening all newborns for hemoglobinopathies (November, 1996). This overview is intended to aid in evaluating infants found to have hemoglobin C Trait or disease by the newborn hemoglobin screen.

Like Hemoglobin S, Hemoglobin C differs from normal hemoglobin due to a point mutation at the N-6 position of the beta globin chain. Unlike hemoglobin S, this hemoglobin does not cause sickling of the erythrocytes by itself. Hemoglobin C does form crystals, but these crystals do not propagate or produce sickling. Hemoglobin C will interact with hemoglobin S to form propagating crystals that cause sickling (and resulting clinical manifestations) in patients who are double heterozygotes for both traits ("SC-disease").

When inherited as a trait, this hemoglobin rarely results in clinically significant abnormalities. Target cells may be seen in the peripheral blood smear. Mild microcytosis may also be noted. Rare patients may have a borderline low hemoglobin, though the vast majority of the individuals with hemoglobin C trait have normal levels of hemoglobin.

Those patients who are homozygous for hemoglobin C usually will have numerous target cells, marked microcytosis, and stomatocytes on their peripheral blood smear. They are likely to have significant life-long hemolytic anemia and splenomegaly.

Most of the infants identified to have hemoglobin C on their screen will have hemoglobin C trait, rather than hemoglobin C disease. The important points to keep in mind while evaluating these children is first, to rule out the double heterozygous state of co-inherited Hemoglobin C trait and beta-thalassemia trait, and second, the need to carefully evaluate both parents' hemoglobin status. It is important to identify those families who may be at risk of having future children who have SC disease. This risk would occur if one parent had sickle cell trait or disease and the other had hemoglobin C trait or disease. Such a family would likely benefit from genetic consultation before additional pregnancies were considered.

For the on-going health care of the identified infant, it should be kept in mind that children with hemoglobin C disease, and a few with hemoglobin c trait will have CBC findings similar to those found in iron deficiency anemia. Children who have chronic anemia due to hemoglobinopathies are likely to be iron replete, or even overloaded, and should not routinely receive therapeutic doses of iron unless documented to have iron deficiency. These children, then, should not receive therapeutic doses of iron unless they are documented to have iron deficiency, even if they are found to have a microcytic anemia.

Children with Hemoglobin C disease do not experience the loss of splenic function that children with sickling syndrome experience; therefore they are not in need of prophylactic antibiotics. Due to excessive hemolysis, children with hemoglobin C disease may develop gallstones early in life. Children with hemoglobin C trait usually do not experience this complication.

To aid in patient counseling, we have developed the enclosed patient information sheet. You may distribute to your patients as needed. If you have additional questions, please call us at 1-800-656-3937, or 402-559-7257. Other hematology specialists are available at (402) 955-3950– Dr David Gnarra at Children's Hospital, or (308) 762-2125 Dr. Howard Koch in Alliance.